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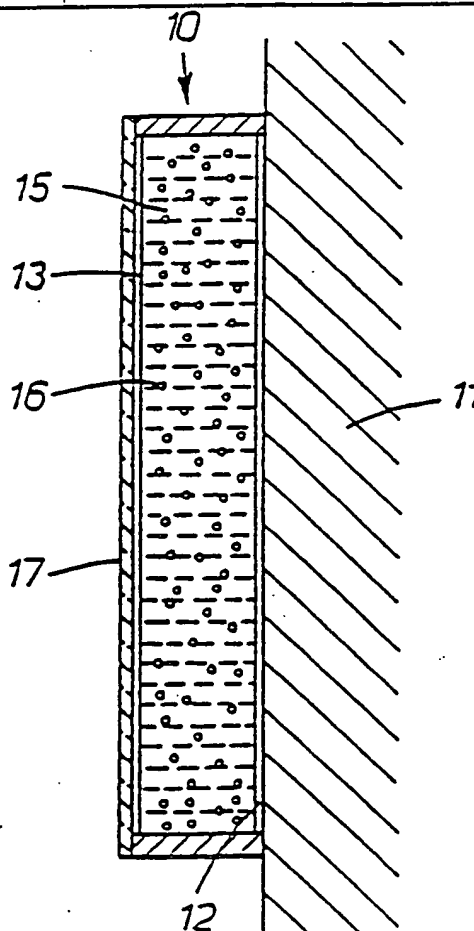
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(54) Title: DISPLAY DEVICE

(57) Abstract

An electrophoretic display device utilizes transparent spheres (16) whose diameter is similar to that of visible light in place of the conventional pigment particles whereby to enhance the retro-reflective effect of the device. The spheres (16) may be glass or plastics or a combination of both with a specific gravity similar to that of the suspension medium (15) in which they are contained.



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DISPLAY DEVICE

The present invention relates to display devices and more particularly to electrophoretic or dielectricphoretic display devices.

Electrophoretic display devices are known and a feature of these devices is that they are passive, i.e. they do not emit light rather they reflect or transmit incident light.

An object of the present invention is to provide an electrophoretic or dielectricphoretic display device with enhanced reflectance in the direction of illumination.

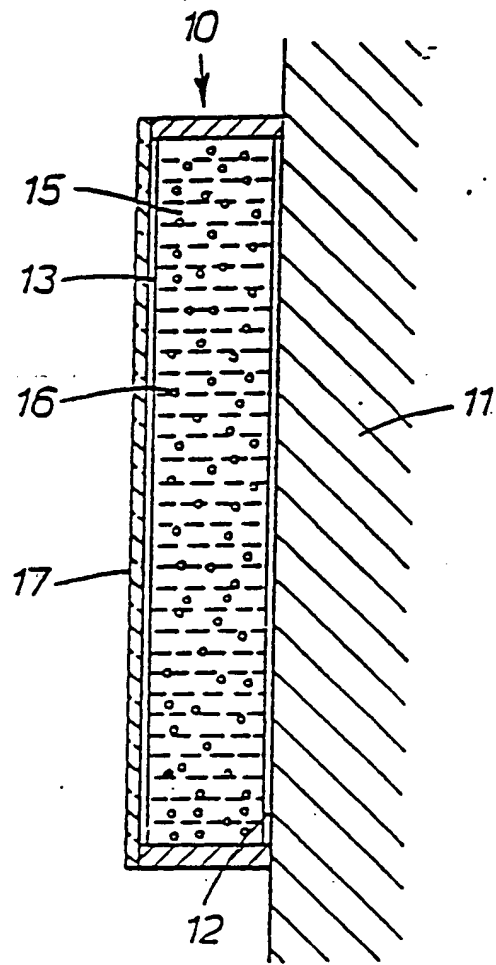
In order that the present invention be more readily understood, an embodiment thereof will now be described by way of example with reference to the accompanying drawing which shows a cross-section through an electrophoretic display device.

An electrophoretic display device 10 comprises a non-conductive substrate 11 to which is applied an electrode 12 and an electrode 13 spaced from the electrode 12. The space between the electrode 12 and the electrode 13 is filled by a liquid material 15 containing small particles 16. When an electric field is applied across the space by a voltage applied to the electrode 12 and electrode 13, the particles migrate to either the electrode 12 or the electrode 13. Either or

be lower than absorption on conventional organic pigments. This provides increased perceived contrast. Also, chemical and light-induced degradation is lower for glass particles than for organic pigments. Thus, 5 the life of the device would be increased.

With glass particles, it may be necessary to process them so that they exhibit an electrophoretic effect. A number of processes are available such as exposing molten glass to an electrical discharge and 10 cooling the glass to trap charged particles in the glass matrix. Alternatively, glass at room temperature could be exposed to ionizing radiation such as cathode rays or X-rays to form charged particles in the glass. Both these processes form electrets but it is also 15 possible to activate the surface of the glass particles chemically and then coat the particles with long chain molecules to cause a charge to be present.

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INTERNATIONAL SEARCH REPORT

International Application No PCT/GB 82/00059

| I. CLASSIFICATION OF SUBJECT MATTER (If several classification symbols apply, indicate all) ¹ According to International Patent Classification (IPC) or to both National Classification and IPC IPC ³ : G 02 F 1/19 | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| II. FIELDS SEARCHED <div style="text-align: center;">Minimum Documentation Searched ⁴</div> <table style="width: 100%; border: none;"> <tr> <td style="width: 20%; border: none;">Classification System</td> <td style="border: none;">Classification Symbols</td> </tr> <tr> <td style="border: 1px solid black; padding: 5px;">IPC³</td> <td style="border: 1px solid black; padding: 5px;">G 02 F 1/19; G 03 G 17/04</td> </tr> </table> <div style="text-align: center; padding-top: 5px;">Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched ⁵</div> | | | Classification System | Classification Symbols | IPC ³ | G 02 F 1/19; G 03 G 17/04 | | | | | | | | | | | | | | | | | | | | |
| Classification System | Classification Symbols | | | | | | | | | | | | | | | | | | | | | | | | | |
| IPC ³ | G 02 F 1/19; G 03 G 17/04 | | | | | | | | | | | | | | | | | | | | | | | | | |
| III. DOCUMENTS CONSIDERED TO BE RELEVANT ¹⁴ <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 10%;">Category ⁶</th> <th style="width: 70%;">Citation of Document, ¹⁴ with indication, where appropriate, of the relevant passages ¹⁷</th> <th style="width: 20%;">Relevant to Claim No. ¹⁸</th> </tr> </thead> <tbody> <tr> <td style="text-align: center; vertical-align: top;">Y</td> <td>US, A, 3954465 (J.B. WELLS et al.) May 4, 1976, see column 2, lines 50-51; column 3, lines 50-51; column 4, lines 15-18</td> <td style="text-align: center; vertical-align: top;">1,2,4</td> </tr> <tr> <td style="text-align: center; vertical-align: top;">Y</td> <td>EP, A1, 0023741 (PHILIPS) February 11, 1981, see page 2, line 32 - page 3, line 21; page 10, lines 18-27</td> <td style="text-align: center; vertical-align: top;">1</td> </tr> <tr> <td style="text-align: center; vertical-align: top;">Y</td> <td>US, A, 4126528 (A. CHIANG) November 21, 1978, see column 1, line 34 - column 2, line 35</td> <td style="text-align: center; vertical-align: top;">1,2,4</td> </tr> <tr> <td style="text-align: center; vertical-align: top;">A</td> <td></td> <td style="text-align: center; vertical-align: top;">3</td> </tr> <tr> <td style="text-align: center; vertical-align: top;">Y</td> <td>L'Onde Electrique, volume 59, no. 10, October 1979 (Paris, FR) J.L. Ploix et al. "Afficheurs par électrophorèse" see pages 65-69, in particular page 66, right-hand column</td> <td style="text-align: center; vertical-align: top;">1</td> </tr> <tr> <td style="text-align: center; vertical-align: top;">A</td> <td>see paragraph III</td> <td style="text-align: center; vertical-align: top;">4,6</td> </tr> <tr> <td style="text-align: center; vertical-align: top;">A</td> <td>Proceedings of the SID, volume 18, no. 3/4, 1977 (Los Angeles, US) I. Ota et al.</td> <td style="text-align: center; vertical-align: top;">./.</td> </tr> </tbody> </table> | | | Category ⁶ | Citation of Document, ¹⁴ with indication, where appropriate, of the relevant passages ¹⁷ | Relevant to Claim No. ¹⁸ | Y | US, A, 3954465 (J.B. WELLS et al.) May 4, 1976, see column 2, lines 50-51; column 3, lines 50-51; column 4, lines 15-18 | 1,2,4 | Y | EP, A1, 0023741 (PHILIPS) February 11, 1981, see page 2, line 32 - page 3, line 21; page 10, lines 18-27 | 1 | Y | US, A, 4126528 (A. CHIANG) November 21, 1978, see column 1, line 34 - column 2, line 35 | 1,2,4 | A | | 3 | Y | L'Onde Electrique, volume 59, no. 10, October 1979 (Paris, FR) J.L. Ploix et al. "Afficheurs par électrophorèse" see pages 65-69, in particular page 66, right-hand column | 1 | A | see paragraph III | 4,6 | A | Proceedings of the SID, volume 18, no. 3/4, 1977 (Los Angeles, US) I. Ota et al. | ./. |
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| <div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>¹⁵ Special categories of cited documents: ¹⁵</p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> </div> <div style="width: 45%;"> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art</p> <p>"Z" document member of the same patent family</p> </div> </div> | | | | | | | | | | | | | | | | | | | | | | | | | | |
| IV. CERTIFICATION <table style="width: 100%; border: none;"> <tr> <td style="width: 50%; border: none;">Date of the Actual Completion of the International Search ¹</td> <td style="width: 50%; border: none;">Date of Mailing of this International Search Report ¹</td> </tr> <tr> <td style="border: 1px solid black; text-align: center; padding: 5px;">May 18, 1982</td> <td style="border: 1px solid black; text-align: center; padding: 5px;">June 10, 1982</td> </tr> <tr> <td style="border: none;">International Searching Authority ¹</td> <td style="border: none;">Signature of Authorized Officer ¹⁹</td> </tr> </table> | | | Date of the Actual Completion of the International Search ¹ | Date of Mailing of this International Search Report ¹ | May 18, 1982 | June 10, 1982 | International Searching Authority ¹ | Signature of Authorized Officer ¹⁹ | | | | | | | | | | | | | | | | | | |
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